HD1761
G6
#72

University of California
College of Agriculture
Agricultural Experiment Station
Berkeley, California

STATISTICAL ANALYSIS OF THE ANNUAL AVERAGE F.O.B. PRICES OF CANNED APRICOTS, 1926-27 TO 1939-40

by

H. R. Wellman and R. S. Bylin

July 1940

LIBRARY
UNIVERSITY OF CALIFORNIA
DAVIS

Contribution from the
Giannini Foundation of Agricultural Economics
Mimeographed Report No. 72

UNIVERSITY OF CALIFORNIA
LIBRARY
COLLEGE OF AGRICULTURE
DAVIS

STATISTICAL ANALYSIS OF THE ANNUAL AVERAGE F.O.B. PRICES OF CANNED APRICOTS, 1926-27 TO 1939-40

H. R. Wellman[1] and R. S. Bylin[2]

The purpose of this report is to present the results of an analysis of the major factors which have influenced the annual average f.o.b. prices received for canned apricots by canners in California from 1926-27 through 1939-40.

In this analysis the average relationship which prevailed from 1926-27 through 1938-39 between the f.o.b. prices of canned apricots and three factors were measured. These three factors are (1) domestic shipments of canned apricots, (2) index of nonagricultural income payments in the United States, and (3) adjusted index of prices of competing canned fruits.

The average relations between the f.o.b. prices and each of the independent variables listed above are shown graphically by the diagonal lines in figure 1. Expressed in numerical terms these relations are as follows: (a) With both the index of nonagricultural income and the adjusted index of prices of competing canned fruits held constant, a change of one million cases in domestic shipments of canned apricots was on the average accompanied by a change in the opposite direction of 40 cents a case in the f.o.b. price of canned apricots; (b) with both domestic shipments of canned apricots and the adjusted index of prices of competing canned fruits held constant, a change of 10 points in the index of nonagricultural income was on the average accompanied by a change in the same direction of 43 cents a case in the f.o.b. price of canned apricots; and (c) with both domestic shipments of canned apricots and the index of nonagricultural income

---

[1] Professor of Agricultural Economics, Agricultural Economist in the Experiment Station, and Agricultural Economist on the Giannini Foundation.

[2] Research Assistant on the Giannini Foundation.

held constant, a change of 10 points in the adjusted index of prices of competing canned fruits was on the average accompanied by a change in the same direction of 26 cents a case in the f.o.b. price of canned apricots.

Differences between the actual prices and those explained by the correlation analysis are given in table 2, column 3. These differences are plotted as deviations from the regression line in figure 1, section C.

Data for the year 1939-40, which are in part preliminary, are also shown in the tables and charts. The actual f.o.b. price of canned apricots in 1939-40 was 5 cents a case below that expected on the basis of the correlation analysis. In only one other year was the difference between the actual and estimated price as small as 5 cents a case. For the period 1926-27 to 1938-39 the standard error of estimate was 20 cents a case.

The characteristics of the demand functions for canned apricots in the United States under different hypotheses are summarized in table 5. Equation 1 gives the results obtained when the f.o.b. price of canned apricots is taken as the dependent variable and the three factors mentioned above are taken as the independent variables.

In equation 2, the volume of domestic shipments of canned apricots (X_2) is taken as the independent variable and is related to the f.o.b. price of canned apricots (X_1), the index of nonagricultural income (X_3), and the adjusted index of competing canned fruit prices (X_4). The fit of the regression surface is not nearly as good in this case as with equation 1. The adjusted coefficient of multiple correlation is only 0.741 as against 0.944 when price is taken as the dependent variable. The net regression of quantity on the adjusted index of prices of competing canned fruits is exceeded by its standard error, and hence the adjusted coefficient of multiple correlation would be raised somewhat if that independent variable were excluded from the analysis. This is shown by equation 4

in which the quantity of domestic shipments (X_2) is related only to X_1 and X_3. $\bar{R}_{2.13}$ is larger than $\bar{R}_{2.134}$.

When price is taken as the independent variable, however, the omission of the adjusted index of prices of competing canned fruits reduces materially the adjusted coefficient of multiple correlation. From equation 3, $\bar{R}_{1.23} = 0.894$; whereas $\bar{R}_{1.234} = 0.944$.

The results obtained when the unadjusted index of prices of competing canned fruits (X_5) -- table 4, column 7 -- is used in place of the adjusted index (X_4) are shown by equations 5 and 6. In general the net regression coefficients are not as large relative to their standard errors in this set of equations as in equations 1 and 2. This is accounted for chiefly by the fact that the unadjusted index of competing canned fruit prices is more highly correlated with the index of nonagricultural income than is the adjusted index. In equation 6, as in equation 2, the net regression of the quantity of canned apricots on the price of competing canned fruits is exceeded by its standard error; hence $\bar{R}_{2.135}$ is smaller than $\bar{R}_{2.13}$. The use of the unadjusted index in lieu of the adjusted index of prices of competing canned fruits reduces the adjusted coefficient of correlation slightly, irrespective of whether the f.o.b. price of canned apricots or the volume of domestic shipments of canned apricots is taken as the dependent variable.

in which the quantity of domestic shipments (X''_2) is a function only of X_1 and X_3. $\bar{R}_{2.13}$ is larger than $\bar{R}''_{2.134}$.

When price is taken as the independent variable, however, the omission of the adjusted index of prices of competing canned fruits reduces materially the adjusted coefficient of multiple correlation. From equation 3, $\bar{R}_{1.234} = 0.894$; whereas $\bar{R}''_{1.23} = 0.844$.

The results obtained when the unadjusted index of prices of competing canned fruits (X''_5) — table 4, column 7 — is used in place of the adjusted index (X_4) are shown by equations 5 and 6. In general, the net regression coefficients are not as large relative to their standard errors as in the case of equations as in equations 1 and 2. This is accounted for chiefly by the fact that the unadjusted index of competing canned fruit prices is more highly correlated with the index of nonagricultural income than is the adjusted index. In equation 6, as in equation 2, the net regression of the quantity of canned apricots on the price of competing canned fruits is exceeded by its standard error; hence $\bar{R}''_{2.135}$ is smaller than $\bar{R}''_{2.13}$. The use of the unadjusted index instead of the adjusted index of prices of competing canned fruits reduces the adjusted coefficient of correlation slightly, irrespective of whether the f.o.b. price of canned apricots or the volume of domestic shipments of canned apricots is taken as the dependent variable.

TABLE 1

Variables Used in the Analysis

Year, June through May	F.o.b. price canned apricots	Domestic shipments of canned apricots	Index of nonagricultural income	Adjusted index of prices of competing canned fruits
	1	2	3	4
	dollars per case	1,000 cases*	per cent	per cent
1926-27	3.85	2,038	101.1	97.7
1927-28	3.97	1,779	101.8	88.2
1928-29	3.67	2,195	105.5	85.5
1929-30	3.97	2,259	106.6	99.4
1930-31	3.32	2,183	94.0	87.3
1931-32	2.64	1,541	78.2	84.5
1932-33	2.23	1,521	63.0	93.5
1933-34	2.37	2,034	67.2	99.6
1934-35	3.47	1,477	73.7	99.5
1935-36	2.93	1,951	80.8	87.3
1936-37	2.75	2,992	92.2	78.5
1937-38	3.02	2,901	92.4	84.8
1938-39	2.55	2,562	89.2	73.9
1939-40	2.77	2,643	94.4 †	75.0 †

* No. $2\frac{1}{2}$ can basis.

† Preliminary -- subject to revision.

Sources of data:

Col. 1: Compiled from reports by canners. Prices are weighted average prices received by canners, f.o.b. cannery or dock, for all grades and sizes of cans on an unadvertised basis. Regular brokerage, cash discount, swell allowance, label allowance, and case allowance are included.

Col. 2: Total shipments minus exports. Total shipments compiled by the Canners League of California. Exports from United States Department of Commerce, Monthly Summary of Foreign Commerce of the United States. See table 3.

Col. 3: Simple average of the monthly indices of national income, excluding agricultural income, 1924-29 average equals 100. Year 1939-40 estimated by assuming the index for May to be the same as for April. June 1932-August 1939 from United States Department of Agriculture Bureau of Agricultural Economics, mimeographed release of November 16, 1939. September 1939-, from United States Department of Commerce, Survey of Current Business, monthly issues (monthly indices, on 1929 base, multiplied by 107.4 per cent).

Col. 4: For sources and method of construction, see table 4.

FIG. 1.-- CALIFORNIA CANNED APRICOTS: AVERAGE F.O.B. PRICES RECEIVED BY CANNERS RELATED TO (A) DOMESTIC SHIPMENTS OF CANNED APRICOTS, (B) INDEX OF NONAGRICULTURAL INCOME, AND (C) ADJUSTED INDEX OF PRICES OF COMPETING CANNED FRUITS, 1926-27 TO 1939-40.

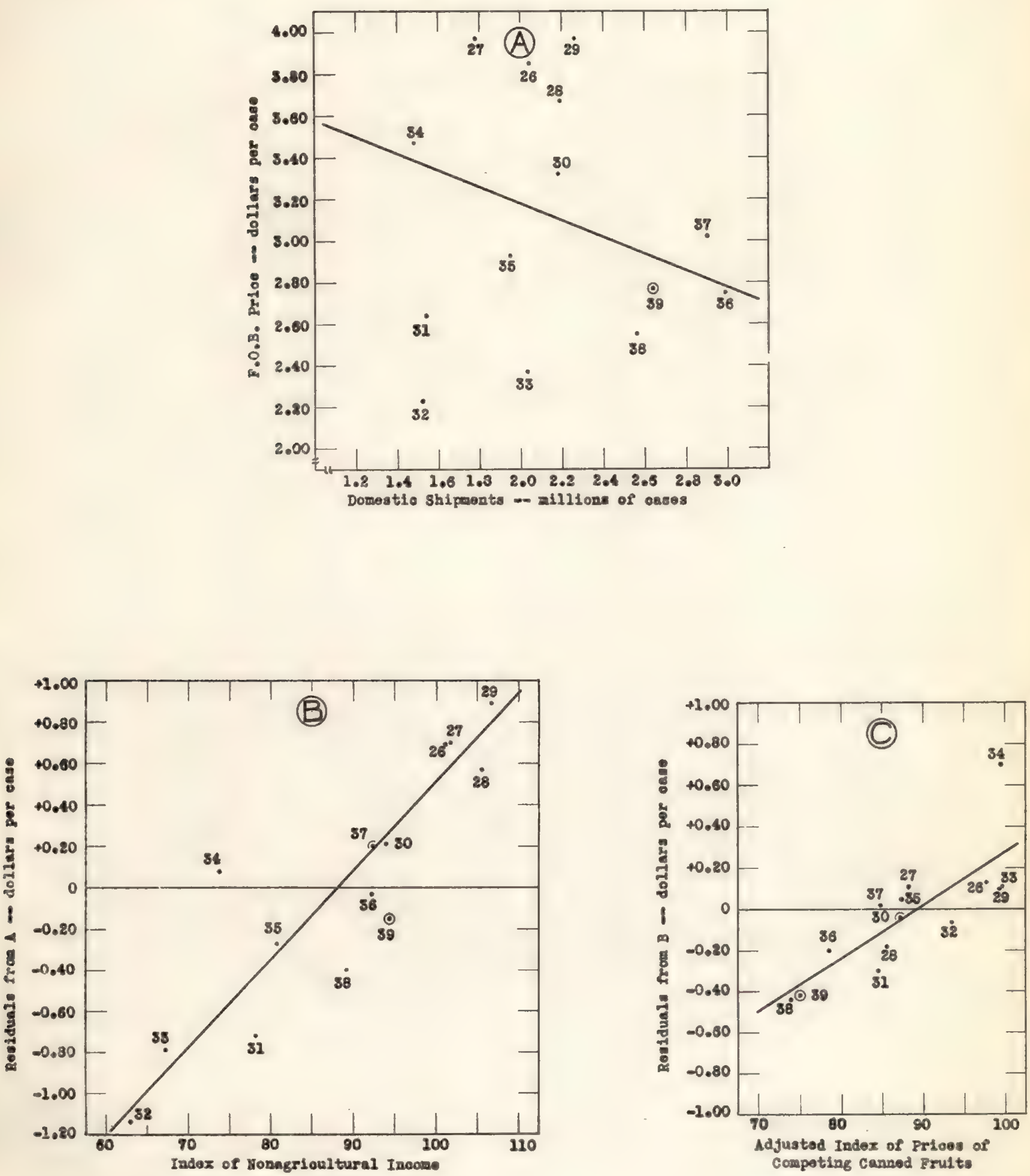

TABLE 2

Actual and Estimated F.o.b. Prices of California Canned Apricots, 1926-27 to 1939-40

Year, June through May	Price as dependent variable		
	Actual price 1 dollars per case	Estimated price 2 dollars per case	Col. 1 minus col. 2 3 dollars per case
1926-27	3.85	3.94	-0.09
1927-28	3.97	3.83	+0.14
1928-29	3.67	3.75	-0.08
1929-30	3.97	4.13	-0.16
1930-31	3.32	3.31	+0.01
1931-32	2.64	2.82	-0.18
1932-33	2.23	2.40	-0.17
1933-34	2.37	2.53	-0.16
1934-35	3.47	3.03	+0.44
1935-36	2.93	2.83	+0.10
1936-37	2.75	2.68	+0.07
1937-38	3.02	2.89	+0.13
1938-39	2.55	2.60	-0.05
1939-40*	2.77	2.82	-0.05

* Preliminary -- subject to revision.

Sources of data:

Col. 1: From table 1, col. 1.

Col. 2: Based on readings from figure 1.

TABLE 3

Pack, Carryover, Shipments, and Exports of California Canned Apricots 1926-27 to 1939-40

Year, June through May	Pack	Carryover from preceding year	Available for shipment	Carryover into following year	Shipments	Exports
	1	2	3	4	5	6
	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases
1926-27	3,227	21	3,248	401	2,847	809
1927-28	2,960	401	3,361	952	2,409	630
1928-29	1,991	952	2,943	154	2,789	594
1929-30	4,023	154	4,177	1,189	2,988	729
1930-31	1,954	1,189	3,143	546	2,597	414
1931-32	2,006	546	2,552	515	2,037	496
1932-33	1,805	515	2,320	323	1,997	476
1933-34	2,416	323	2,739	167	2,572	538
1934-35	1,774	167	1,941	227	1,714	237
1935-36	3,164	227	3,391	844	2,547	596
1936-37	2,899	844	3,743	228	3,515	523
1937-38	5,553	228	5,781	2,305	3,476	575
1938-39	1,547	2,305	3,852	528	3,324	762
1939-40	3,338	528	3,866	479	3,387	744*

* Preliminary -- subject to revision.

Sources of data:

Cols. 1, 2 and 4: Compiled by the Canners League of California.

Col. 3: Col. 1 plus col. 2.

Col. 5: Col. 3 minus col. 4.

Col. 6: United States Department of Commerce, Monthly Summary of Foreign Commerce of the United States, converted at 45 pounds per case of 24 No.2$\frac{1}{2}$ cans.

TABLE 4

Construction of Index of Prices of Canned Fruits Competing with Canned Apricots
1926-27 to 1939-40

Year, June through May	Prices			Relatives of prices			Unadjusted index of prices of competing canned fruits	Index of nonagricultural income	Adjusted index of prices of competing canned fruits
	Canned clingstone peaches	Canned Bartlett pears	Canned pineapples	Canned clingstone peaches	Canned Bartlett pears	Canned pineapples			
	1	2	3	4	5	6	7	8	9
	dollars per case	dollars per case	dollars per dozen cans	1924-29 = 100					
1926-27	3.66	4.31	2.35	99	90	103	98.8	101.1	97.7
1927-28	3.17	4.60	2.10	86	96	92	89.8	101.8	88.2
1928-29	3.22	4.13	2.20	87	86	96	90.2	105.5	85.5
1929-30	4.08	4.82	2.35	111	101	103	106.0	106.6	99.4
1930-31	2.88	3.53	2.10	78	74	92	82.1	94.0	87.3
1931-32	2.55	2.82	1.50	69	59	65	66.1	78.2	84.5
1932-33	1.97	2.48	1.60	53	52	70	58.9	63.0	93.5
1933-34	2.31	2.64	1.80	63	55	79	66.9	67.2	99.6
1934-35	2.69	3.05	1.80	73	64	79	73.3	73.7	99.5
1935-36	2.51	2.92	1.80	68	61	79	70.5	80.8	87.3
1936-37	2.66	2.92	1.80	72	61	79	72.4	92.2	78.5
1937-38	2.96	3.07	1.90	80	64	83	78.4	92.4	84.8
1938-39	2.30	2.77	1.71	62	58	75	65.9	89.2	73.9
1939-40	2.44	3.27	1.79	66	68	78	70.8	94.4*	75.0*

* Preliminary -- subject to revision.

Sources of data:

Cols. 1 and 2: Compiled from reports by canners. Prices are weighted average prices for all grades and sizes of cans, f.o.b. cannery or dock on an unadvertised basis. Canned clingstone peach prices are for California, canned Bartlett pear prices are for the Pacific Coast.

Col. 3: Opening prices for No. 2½ Sliced Fancy Pineapple, Hawaii, as given in Western Canner and Packer, 1937 Yearbook, p. 85. 1937-38 to 1939-40 prices from California Fruit News, weekly issues.

Cols. 4, 5 and 6: Prices given in columns 1, 2 and 3 in per cent of their 1924-29 averages -- canned clingstone peaches, $3.687; canned Bartlett pears, $4.783; canned pineapples, $2.292.

Col. 7: Weighted combination of relatives in cols. 4, 5, and 6 using following weights -- canned clingstone peaches, 8; canned Bartlett pears, 3; canned pineapples, 6.

Col. 8: From table 1, col. 3.

Col. 9: Col. 7 divided by col. 8.

TABLE 5

Characteristics of Demand Functions for Canned Apricots Under Various Hypotheses, 1926-27 to 1938-39

X_1 = Annual average f.o.b. price of canned apricots (in dollars per case).

X_2 = United States domestic shipments of canned apricots (in millions of cases).

X_3 = Index of nonagricultural income in the United States (in percentage points).

X_4 = Adjusted index of prices of competing canned fruits (in percentage points).

X_5 = Unadjusted index of prices of competing canned fruits (in percentage points).

Equation	Dependent variable	Constant term	Independent variables					Standard error of estimate	Adjusted coefficient of multiple correlation
			X_1	X_2	X_3	X_4	X_5	$\bar{S}$	$\bar{R}$
1	X_1	-2.0946		-0.4019 (0.1573)	+0.0429 (0.0046)	+0.0257 (0.0084)		0.203	0.944
2	X_2	-0.2054	-1.0454 (0.4098)		+0.0521 (0.0169)	+0.0112 (0.0190)		0.327	0.741
3	X_1	+0.6386		-0.6475 (0.1836)	+0.0438 (0.0062)			0.275	0.894
4	X_2	+0.8732	-0.8551 (0.2428)		+0.0444 (0.0103)			0.316	0.761
5	X_1	+0.3473		-0.4074 (0.1675)	+0.0170 (0.0109)		+0.0274 (0.0099)	0.214	0.938
6	X_2	+0.8593	-0.9734 (0.4002)		+0.0418 (0.0129)		+0.0079 (0.0207)	0.331	0.735